

## ABSTRACT OF THE DISCLOSURE

Processes for the addition or removal of a layer or region from a workpiece material by contact with a process gas in the

5 manufacture of a microstructure are enhanced by the use of recirculation of the process gas. Recirculation is effected by a pump that has no sliding or abrading parts that contact the process gas, nor any wet (such as oil) seals or purge gas in the pump. Improved processing can be achieved by a process chamber that contains a baffle, a perforated plate,

10 or both, appropriately situated in the chamber to deflect the incoming process gas and distribute it over the workpiece surface. In certain embodiments, a diluent gas is added to the recirculation loop and continuously circulated therein, followed by the bleeding of the process gas (such as an etchant gas) into the recirculation loop. Also, cooling of

15 the process gas, etching chamber and/or sample platen can aid the etching process. The method is particularly useful for adding to or removing material from a sample of microscopic dimensions.